

ANNEX L

CLOSURE STRATEGY

**U.S. Army
Chemical Materials Agency**

**Project Manager for
Non-Stockpile Chemical Materiel**

**Explosive Destruction System
Operation at Dugway Proving Ground
Closure Strategy**

**Final
Revision 2**

**U.S. Army
Chemical Materials Agency**

**Project Manager for
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**Explosive Destruction System
Operation at Dugway Proving Ground
Closure Strategy**

**Final
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1. INTRODUCTION

This Closure Strategy describes performance standards and procedures to clean close the Explosive Destruction System (EDS) for reuse. This plan presents methods to identify contaminated system equipment; decontaminate contaminated system equipment; dispose of all wastes and contaminated materials; perform verification sampling to confirm successful decontamination; and certify closure.

1.1 General Description

The EDS will be located at Dugway Proving Ground (DPG) as shown in **Figure L-1**. The EDS unit will be operated in an Environmental Enclosure (EE) as identified in **Figure L-2**.

The EDS will be used for the following operations:

- Accessing chemical-filled munitions and sample items using explosive charges
- Treating chemical fill, explosive residues, and contaminated solids (munition casing fragments) with chemical reagent.

Neutralent, rinsewaters, and waste solids from EDS operations will be containerized and stored in a less than 90-day waste storage area pending shipment to an offsite permitted treatment, storage, and disposal facility (TSDF) for further management.

1.2 Closure Strategy

Figure L-3 presents the general decision process to clean close the EDS.



Figure L-1. EDS Location at DPG

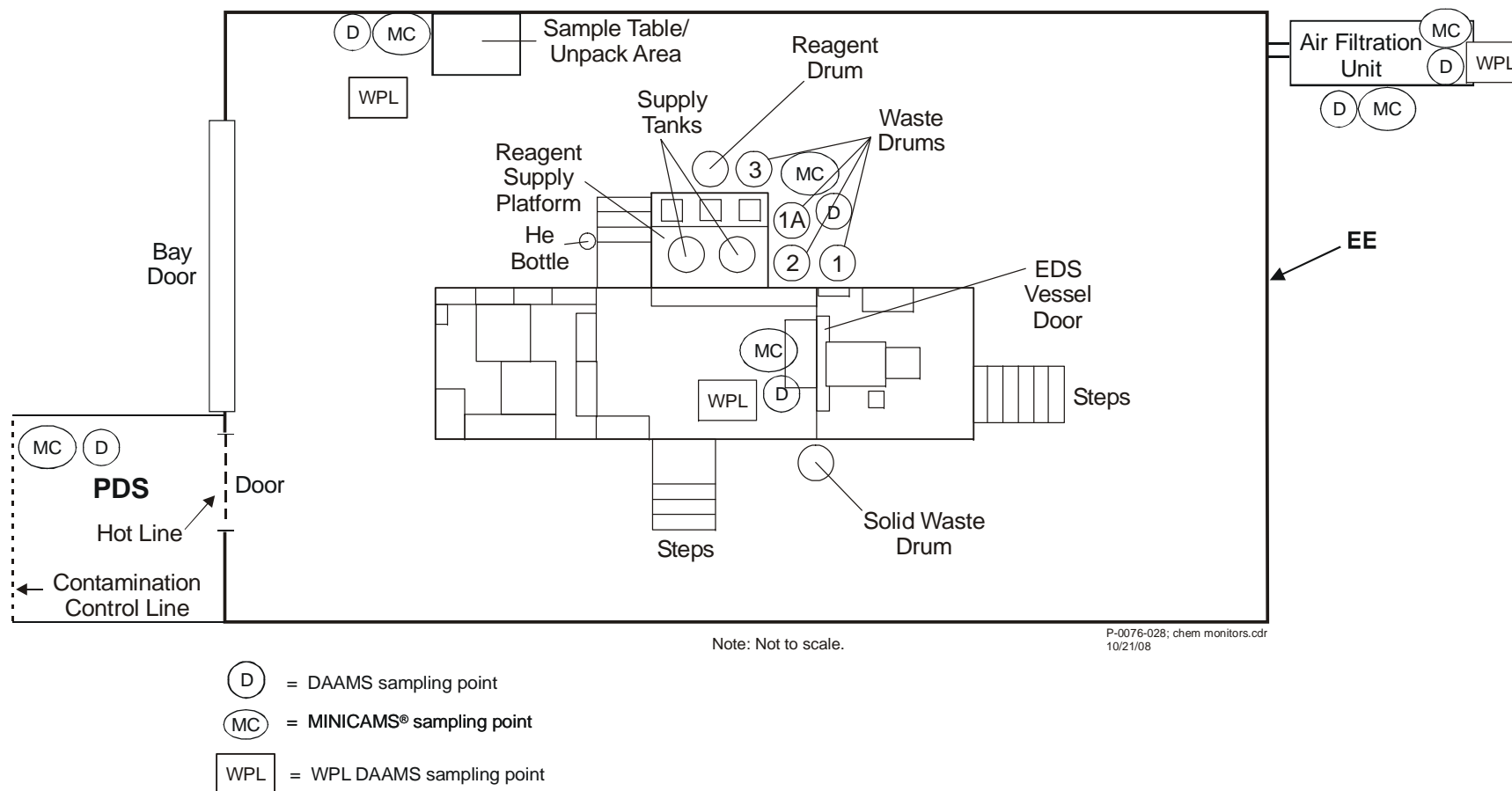
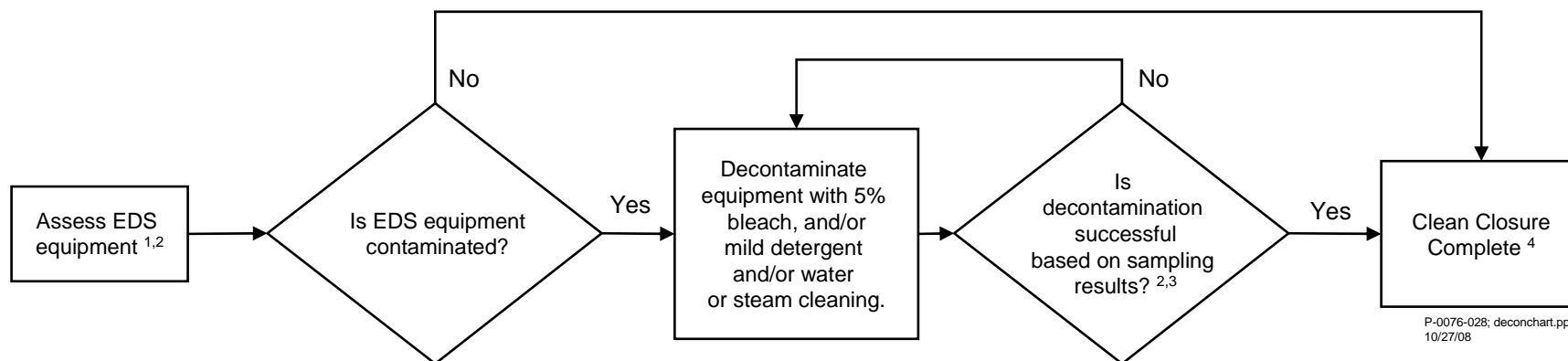


Figure L-2. EDS Layout Inside EE



NOTES:

- ¹ Determining potential equipment contamination will be based on air monitoring, review of the operating log, inspection records, and process knowledge.
- ² Air monitoring for chemical agent will be performed for EDS components located in the EE using MINICAMS® or DAAMS. MINICAMS alarms will be confirmed by DAAMS. Results will be compared to closure performance standards for air monitoring (see **Table L-1**).
- ³ Clean rinsewater will be sampled and analyzed. Results will be compared to closure performance standards for rinsewaters (see **Table L-1**).
- ⁴ The EDS unit or component can be removed from EE.

Figure L-3. General Decision Process for Clean-Closure

The EDS and associated equipment addressed in this closure strategy include the EDS trailer, Containment Vessel, and waste storage subsystems.

Upon completion of closure activities, there will be no hazardous waste residues remaining on the EDS and associated equipment or in the EE.

Per Utah R315-8-7 Closure and Post-Closure (that incorporates by reference 40 CFR 264.111), an owner or operator must close a permitted hazardous waste management unit in a manner that minimizes the need for further maintenance and controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the groundwater, surface waters, or the atmosphere.

All EDS operations are performed in a manner designed to control and eliminate escape of hazardous waste and hazardous constituents into the environment. EDS operations at DPG will take place inside an EE comprised of a ceiling, sides, and flooring that will protect the hazardous waste management unit from precipitation and run-on as well as prevent the creation of any contaminated runoff. Engineering and administrative controls in place, such as the EDS trailer secondary containment pan that is capable of containing the contents of a full Containment Vessel; an air filtration system with carbon filtration; use of trained explosive handling and chemical operators; approved work procedures; use of appropriate personal protective equipment (PPE); and prohibition of open flames, cutting, welding, smoking, and radiant heat inside the EE all contribute to controlling, minimizing, or eliminating the possibility of contamination to groundwater, surface waters, or the atmosphere from EDS operations.

Finally, at the conclusion of every treatment operation, procedures are followed for servicing, cleaning, disassembly, and decontaminating (if necessary) EDS components to acceptable levels for closeout so that the EDS may be reused for subsequent operations at the same location or mobilized to a new location.

These procedures involve the following:

- Performing decontamination of the Containment Vessel and Containment Vessel door
- Disassembling components of the Containment Vessel and Containment Vessel Door, decontaminating components (O-ring, Grayloc[®] seal, protector plate, blast shield, and covers, etc.), and manually cleaning/decontaminating the components
- Scrubbing the interior of the Containment Vessel
- Following all cleaning/decontamination with clean water rinses
- Clearing sample and drain lines on the Containment Vessel Door
- Cleaning EDS Trailer contact surfaces (electrical panels, debris pan, spill containment trays, railings, and other operator-contacted surfaces)
- Cleaning the EDS Trailer secondary containment pan and platform secondary containment pan
- Collecting all cleaning solutions and rinsewaters and managing them appropriately based on sampling and analysis results according to the Waste Management Plan

- Collecting components/parts that are not reused and placing the items in waste containers for disposal
- Performing air monitoring or other means to confirm cleaning/decontamination to acceptable levels for equipment reuse
- Reassembling EDS components, such as the Containment Vessel Door, and securing the EDS and associated equipment for demobilization.

Cleaning/decontaminant solutions may be general household bleach and/or general detergent or other appropriate decontaminant and technique referenced in Field Manual (FM) 3-5 or identified in Table 1, Alternative Treatment Standards for Hazardous Debris (40 CFR 268.45). The U.S. Environmental Protection Agency recommends and approves the use of the Table 1 alternate treatment standards for Resource Conservation and Recovery Act (RCRA) closure purposes. For example, sodium hypochlorite (NaOCl), a standard decontaminant for chemical agent, is identified as a suitable decontaminant under the category chemical destruction technology. The decontamination/cleaning solutions are generally applied manually through use of a spray device or by wiping down with cloth or paper towels and wipes.

Prior to initiating closure and verification activities to confirm successful decontamination of the EDS, the procedures described previously will have been conducted and air monitoring results recorded; reagent supply containers and reagent transfer pumps disconnected; all EDS process and cleaning wastes will have been collected, containerized, and removed from the EE. Wastes will be properly characterized as outlined in the Waste Management Plan (**Annex F** of the EDS Destruction Plan) and temporarily stored in a less than 90-day waste storage area pending shipment offsite for further treatment and/or disposal.

Air monitoring results will be compared to the closure performance standards listed in **Table L-1**. If results do not meet the closure performance standards, then decontamination will be repeated until the closure performance standards are met.

Once air monitoring results meet the closure performance standards, a final rinsewater sampling will be conducted using de-ionized water as the rinsate. The sampling method and EDS components and areas selected for de-ionized water rinsate sampling are identified in **Appendix L-1**. Rinsewater sampling results will be compared against the closure performance standard values listed in **Table L-1**; if rinsewater analytical results

Table L-1. Closure Performance Standards

Media and Parameter	Performance Standard ^a
Air Samples	
Sarin (GB) Soman (GD)	≤ 0.7 VSL ≤ 0.7 VSL
Mustard (HD/HT)	≤ 0.7 VSL
VX	≤ 0.7 VSL
Rinsewaters ^{b,c}	
Soman (GD)/Sarin (GB)	20 ppb
VX	20 ppb
Mustard (HD/HT)	200 ppb

Notes:

- ^a Standards are considered exceeded when concentration results from at least two cycles of MINICAMS[®] or Depot Area Air Monitoring System (DAAMS) sampling are above the closure performance standard.
- ^b Rinsewaters will be waste coded as F999.
- ^c Performance standard value is based on de-ionized water rinsate.

mg/m³ = milligram per cubic meter
ppb = parts per billion

do not meet the closure performance standards in **Table L-1**, equipment will be decontaminated until the performance standards are met.

The EDS will be deemed clean-closed when both air monitoring and rinsewater sampling results meet the closure performance standards identified in **Table L-1**.

The air filtration system will remain operating and monitoring conducted until air monitoring and rinsewater sample results are received.

Once the EDS unit is certified clean-closed, the EDS and EE will be demobilized for reuse. Demobilization will involve removing the EDS trailer-mounted equipment from the enclosure and dismantling the enclosure for use at another location. If during demobilization, equipment or areas are discovered to be contaminated, these areas and/or equipment will be decontaminated and decontamination verified as previously described.

The types of wastes expected to be generated from closure activities include spent decontamination solutions; rinsewaters; used PPE; and wipes, rags, and other absorbent and cleaning materials used to conduct decontamination. If the carbon filters from the air filtration system cannot be reused, they will be removed and managed as State of Utah waste code P999 hazardous waste. Rinsewaters will be managed as State of Utah waste code F999.

2. CLOSURE PERFORMANCE STANDARDS

Clean-closure of the EDS unit and associated equipment will be deemed complete when air monitoring and rinsewater sampling results meet the closure performance standards identified in **Table L-1**. Air will be monitored for specific periods as detailed in **Table L-2**.

Table L-2. Air Monitoring Sampling Requirements

Item	Air Monitoring Sampling Conditions
Equipment	Isolate potentially contaminated equipment by enclosing in plastic and allowing headspace in the enclosure to equal equilibrium for 4 hours at or above 70°F before monitoring.
Fixed Equipment	4 hours at or above 70°F before monitoring
Portable Equipment	4 hours at or above 70°F before monitoring

Notes:

After the conditions listed in this table are established, MINICAMS[®] or Depot Area Air Monitoring System (DAAMS) samples will be collected. MINICAMS alarms will be confirmed using DAAMS. If results meet closure performance standards in **Table L-1**, the structure or equipment is considered clean-closed.

Closure performance standards for air monitoring of chemical agents are based on headspace vapor sampling and analysis and are established as the worker population limit (WPL), which is the maximum allowable 8-hour time-weighted average concentration of chemical agent that an unmasked worker could be exposed for an 8-hour workday and 40-hour week for 30 years without adverse affect.

Sampling conducted to determine decontamination and clean-closure is summarized in **Table L-3**.

Upon closure of the EDS unit and associated equipment, there will be no hazardous wastes or hazardous waste constituents, including decontamination wastes, remaining. Prior to beginning closure, all treatment residues and related wastes will be removed from the EDS site. All wastes generated during closure activities, such as spent decontamination solutions and rinsewaters, will be containerized, sampled, analyzed, characterized, and managed appropriately, based on waste classification and in accordance with applicable regulatory requirements. Spent decontamination solutions and rinsewaters will be managed as F999 hazardous waste. Closure wastes will be placed in a less than 90-day waste storage area pending shipment to a permitted TSDF.

Table L-3. Sampling and Analysis Methods^a

Sample Source	Number of Samples	Sampling Method/ Equipment	Analytical Parameters	Analytical Method	Sample Holding Time
Headspace Gas Sample of EE and EDS Equipment	Two sampling cycles for each equipment or space	Low-level air monitor/using MINICAMS [®] or DAAMS ^b	Chemical ^c Agents	IOP MT-02 (MINICAMS), MT-11 (DAAMS), and MT-13 (GC/MS)	N/A
Rinsewaters	Two	Grab	Chemical ^c Agents	SOP Number CNG-044 IOP MT-8	N/A

Notes:

^a DPG laboratory will perform confirmation agent analysis for all wastes, using state-approved analytical methods.

^b DAAMS will be used to confirm MINICAMS alarm.

^c Mustard, GB, GD, and VX, and HT will be measured. HT will be measured as HD.

DAAMS	=	Depot Area Air Monitoring System
EDS	=	Explosive Destruction System
EE	=	Environmental Enclosure
GB	=	sarin
GC/MS	=	gas chromatography/mass spectrometry
GD	=	soman
HT	=	thickened mustard
IOP	=	Internal Operating Procedure
N/A	=	not applicable
SOP	=	Standing Operating Procedure
VX	=	O-ethyl S-(2-diisopropylaminoethyl)methylphosphonothioate

During closure activities, personnel will use appropriate personal protective clothing and equipment as determined by the EDS Site Safety and Health Officer. In general, Department of the Army Pamphlet (DA Pam) 385-61, *Toxic Chemical Agent Safety Standards*, will be followed, as well as Occupational Safety and Health Administration (OSHA) safety standards.

3. DISPOSAL OR DECONTAMINATION OF EQUIPMENT, STRUCTURE, AND SOILS

Soil removal should not be necessary during closure because the EDS operations are enclosed (enclosure consists of ceiling, sides, ground cover, and flooring) and conducted on a trailer platform with secondary containment. Any incidents involving chemical agent release or hazardous waste during operations would have been managed under Emergency Response and Contingency Actions, outlined in the site-specific Safety, Health, and Emergency Response Plan in **Annex I** of this EDS Destruction Plan.

4. CLOSURE SCHEDULE

Table L-4 presents the proposed closure schedule and sequence of activities for the EDS.

5. CERTIFICATION OF CLOSURE

When the EDS operations are concluded, an independent State of Utah registered Professional Engineer will review operating records and closure activities as follows:

- Confirm and evaluate any spills, releases, and clean up activities noted.
- Confirm that the EDS procedures for closeout (servicing, cleaning/decontaminating, and preparing the EDS and associated equipment for reuse and demobilization) were followed.
- Confirm that the EDS was air monitored to verify adequacy of cleaning/decontamination.

Table L-4. Estimated Closure Sequence

Activity	Day Completed
<u>Explosive Destruction System (EDS)</u>	
Initiate Closure Activities	Day 0
PE will:	Day 1 - 4
<ul style="list-style-type: none"> • Confirm and evaluate any spills, releases, and cleanup activities noted. • Confirm that the EDS procedures for closeout (servicing, cleaning/decontaminating, and preparing the EDS and associated equipment for reuse and demobilization) were followed. • Confirm that the EDS was air monitored to verify adequacy of cleaning/decontamination. • Confirm air monitoring results were documented and that the recorded values met the closure performance standards. • Observe/confirm de-ionized water rinsate sampling and analysis conducted according to procedure. • Confirm de-ionized water rinsate sampling results met the closure performance standards. • Confirm that wastes generated from closure activities were transferred to a less than 90-day waste storage area. 	
Remove EDS from EE/Demobilize EDS and EE	Day 5 -7
Ship All Wastes Generated from Closure to a TSDF	Day 8
Complete All Closure Activities	Day 10
Submit Closure Notice and Certification to the UDEQ	Day 20 - 30

Notes:

EE = Environmental Enclosure
PE = Professional Engineer
TSDF = treatment, storage, and disposal facility
UDEQ = Utah Department of Environmental Quality

- Confirm air monitoring results were documented and that the recorded values met the closure performance standards.
- Observe/confirm de-ionized water rinsate sampling and analysis conducted according to procedure.
- Confirm de-ionized water rinsate sampling results met the closure performance standards.
- Confirm that wastes generated from closure activities were transferred to a less than 90-day waste storage area pending shipment offsite to a TSDF or directly to a TSDF.

When the closure performance standards for air monitoring and rinsate sampling have been met, the independent Professional Engineer will certify that the EDS was clean-closed in accordance with the approved closure strategy and all applicable regulations.

On completing closure activities, the U.S. Army will submit a written notice with certificate, signed by the owner/operator, DPG Commander (or a designee), and an independent state of Utah registered professional engineer, that the EDS has been closed in accordance with the approved closure strategy and all applicable regulations to the Executive Secretary, Utah Department of Environmental Quality (UDEQ), Solid and Hazardous Control Board. Documentation of closure activities will be maintained by the certifying independent registered professional engineer and the Army. The

closure certification will be accompanied by the following statement, signed by the U.S. Army (as owner) and the operator:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

The following information will also be submitted to the Executive Secretary for approval to document that the EDS is clean-closed and will be included in the after action report: (1) manifests; (2) operating records showing that all wastes have been characterized and managed according to the Waste Management Plan; (3) chemical agent results for waste rinsewaters and decontamination solutions; (4) air monitoring analytical results showing that the EDS meets the closure performance standards presented in **Table L-1**; and (5) a list of the areas and equipment identified for sampling during contamination assessment.

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APPENDIX L-1
EDS AT DPG CLOSURE DE-IONIZED WATER RINSATE
SAMPLING PROCEDURE

APPENDIX L-1

EDS AT DPG CLOSURE DE-IONIZED WATER RINSATE SAMPLING PROCEDURE

Purpose:

Sampling will be conducted to verify clean-closure of the EDS unit and associated equipment.

Objective:

Sample final water rinsates from the following components of the EDS after completing EDS Standing Operating Procedure (SOP) 3X Procedures:

1. Inside the EDS Containment Vessel
2. EDS Containment Vessel door with all door parts assembled and secured to the door
3. EDS Trailer Secondary Containment Pan (located below the floor grating)
4. The four secondary containment "drum tubs"
5. Conveyance hoses and lines
6. Personnel Decontamination Station (PDS) Decontamination Sump.

Two samples will be collected from each component or area identified previously.

Once the rinsate samples have been collected from the previously listed EDS components/areas, the rinsate wastes can be commingled into a single container for easier management. If required, any RCRA characterization sample(s) will be collected by the Project Manager for Non-Stockpile Chemical Materiel (PMNSCM) or DPG from the rinsate waste container once the container has been transferred to the less than 90-day waste storage area.

Target Analytes:

Chemical agents of concern associated with this EDS operation. See **Table L-1** of the EDS at DPG Closure Plan.

Laboratory:

To be determined

Participants:

EDS Crew Members/others

Observers:

Independent Utah-certified professional engineer

Sampling Method:

Grab/Catch Samples

PPE Requirements:

PPE Level D Requirements:

- Tyvek[®] overalls
- Nitrile gloves
- Safety goggles
- Safety shoes.

Rinse Equipment:

- One 2-gallon plastic garden sprayer
- One 500-milliliter (mL) squeeze bottle
- Ten gallons (or more) of de-ionized water
- One plastic pan of adequate capacity to catch and transfer rinsates to sample bottles
- Paper towels
- Waste container(s) for rinsate waste; two 5-gallon pails may be used or other containers as appropriate.

Sample Preparation and Shipment:

Services and Sample Preparation materials:

- 1 liter sample bottles (24 bottles just in case of need)
- Sample labels
- Chain(s) of custody
- Clear packing tape for positive closure of sample jars
- Sample coolers approved for Department of Transportation (DOT) shipment
- Ice for sample preservation
- Plastic “bubble wrap” for packaging in coolers
- Adequate rubber bands to secure bubble wrap around sample jars
- DOT Labels (if required) and address labels for shipping coolers (if required)
- Facilitate shipment or pickup by an appropriate overnight carrier (if required).

Sampling Procedures:

1. EDS Containment Vessel - Interior

Two EDS technicians will be used in this sampling event. One technician will open the vessel door and, with a de-ionized water-filled garden sprayer, generously spray interior of vessel (top, side, bottom, and dove tail). Concurrently, the second technician will catch the rinsate stream exiting the vessel at the bottom of the vessel opening using a catch pan. Spraying will continue until the entire area has been sprayed. Sampling personnel will collect the samples from the plastic catch pan. Remaining rinsate will be placed into a designated waste container that will be used for all rinse wastes generated from this closure sampling activity.

2. EDS Containment Vessel Door

One EDS sampling technician will place a clean plastic pan on the steel grating beneath the Containment Vessel door. The technician will then proceed to use the de-ionized water-filled garden sprayer to rinse all areas on the inner side of the Containment Vessel door. The rinsate produced will be captured in the plastic catch pan. Spraying will continue until the entire area has been sprayed. Sampling personnel will collect the samples from the plastic catch pan. Remaining rinsate will be placed into the designated rinsate waste container.

3. EDS Trailer Secondary Containment

The EDS Trailer Secondary Containment Pan lies under the floor platform grating of the EDS. Two EDS technicians will participate in this sampling event. One technician will use a de-ionized water-filled garden sprayer to

spray over the entire containment pan bottom and sides. Spray activity will continue until the entire floor of the containment pan has been sprayed. The second technician will collect the containment pan rinsate in a plastic pan of adequate size to hold the rinsate from at least one pass across the containment pan. Sampling personnel will collect the samples from the plastic catch pan. Remaining rinsate will be placed into the designated rinsate waste container.

4. Four Drum Secondary Containment Tubs: (W1, W1A, W3, and PDS)

An EDS technician will use a garden sprayer filled with de-ionized water to spray the bottom and sides of each Drum Secondary Containment Tub. The drum tub will be elevated and laid on its side in a manner that will allow the placement of a plastic catch pan underneath the opening of a tub to catch the rinsate as it exits the tub. Sampling personnel will collect the samples from the plastic catch pan. Remaining rinsate will be placed into the designated rinsate waste container.

5. EDS Liquid Waste Conveyance hoses and lines:

Representative hazardous waste conveyance line(s)/hose(s) will be selected. Based on closure sampling conducted during previous EDS at DPG operations in 2004, the lines to be rinse sampled are the QE vessel effluent line, the monoethanolamine (MEA) neutralent line to drum number 1, and the MEA water rinse line to drum number 1A.

An EDS technician will use a garden sprayer or other spray source, for example a squirt bottle, filled with de-ionized water to spray into the elevated side of the hose allowing water to pass through and be collected at the opposite end into a plastic catch pan. Sampling personnel will

collect the samples from the plastic catch pan. Remaining rinsate will be placed into the designated rinsate waste container.

6. The PDS Sump

The PDS decontamination sump will be rinsed using a garden sprayer filled with de-ionized water. The EDS technician will rinse the bottom and sides of the sump until enough rinsate has been collected to fill two sample bottles. One corner of the sump will be elevated, allowing the rinsate to flow to the opposite corner. Two additional technicians may be required to elevate the two adjacent corners of the sump to allow the rinsate to flow to one corner. A fourth technician will collect a grab sample of the rinsate, in sufficient volume to fill two sample bottles. Remaining rinsate will be placed into the designated rinsate waste container.

Waste Management and RCRA Characterization

All excess rinsates will be placed in a DOT-approved container (possibly a 5-gallon plastic, closed top pail for liquids). The container will be labeled as hazardous waste pending RCRA characterization. The waste container will be transferred to DPG waste contractor personnel for management. If required, RCRA characterization samples will be collected from the rinsate waste container at the less than 90-day waste storage area.

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